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PCT  
PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 09 February 2000 (09.02.00)	
<b>International application No.</b> PCT/GB99/01756	<b>Applicant's or agent's file reference</b> PEND/P20878PC
<b>International filing date (day/month/year)</b> 04 June 1999 (04.06.99)	<b>Priority date (day/month/year)</b> 05 June 1998 (05.06.98)
<b>Applicant</b> MCKNIGHT, Jo et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

05 January 2000 (05.01.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Jean-Marc Vivet

Telephone No.: (41-22) 338.83.38

COMUS	PARTNER
NOTTM	OFFICE
29 DEC 1999	
ACTIONED BY: PCT	

# INTERNATIONAL COOPERATION TREATY

From the INTERNATIONAL BUREAU

To:

DEALTRY, Brian  
Eric Potter Clarkson  
Park View House  
58 The Ropewalk  
Nottingham NG1 5DD  
ROYAUME-UNI

## NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

Date of mailing (day/month/year) 16 December 1999 (16.12.99)		
Applicant's or agent's file reference PEND/P20878PC		IMPORTANT NOTICE
International application No. PCT/GB99/01756	International filing date (day/month/year) 04 June 1999 (04.06.99)	Priority date (day/month/year) 05 June 1998 (05.06.98)
Applicant COURTAULDS TEXTILES (HOLDINGS) LIMITED et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

AU,CN,EP,IL,JP,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CU,CZ,DE,DK,EA,EE,ES,FI,GB,GD,GE,GH,GM,HR,HU,  
ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,SD,  
SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on

16 December 1999 (16.12.99) under No. WO 99/64238

### REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

### REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer J. Zahra Telephone No. (41-22) 338.83.38
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# PATENT COOPERATION TREATY

From the:  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

# PCT

## WRITTEN OPINION

(PCT Rule 66)

To:

DEALTRY, Brian  
ERIC POTTER CLARKSON  
Park View House  
58 The Ropewalk  
Nottingham NG1 5DD  
GRANDE BRETAGNE

COMUS	PARTNER
NOTTM.	27 MAR 2000
OFFICE	
ACTIONED BY:	

Date of mailing  
(day/month/year)

24.03.2000

Applicant's or agent's file reference

PEND/P20878PC

REPLY DUE

within 3 month(s)  
from the above date of mailing

International application No.

PCT/GB99/01756

International filing date (day/month/year)

04/06/1999

Priority date (day/month/year)

05/06/1998

International Patent Classification (IPC) or both national classification and IPC

B32B27/12

Applicant

COURTAULDS TEXTILES (HOLDINGS) LIMITED et al.

- This written opinion is the first drawn up by this International Preliminary Examining Authority.
- This opinion contains indications relating to the following items:
  - ☒ Basis of the opinion
  - ☐ Priority
  - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - ☐ Lack of unity of invention
  - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - ☐ Certain document cited
  - ☐ Certain defects in the international application
  - ☐ Certain observations on the international application
- The applicant is hereby invited to reply to this opinion.
 

**When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

**How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also:** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.  
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
- The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 05/10/2000.

Name and mailing address of the international preliminary examining authority:

 European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Schambeck, W

Formalities officer (incl. extension of time limits)

Ridé, M-C

Telephone No. +49 89 2399 8082



**I. Basis of the opinion**

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

**Description, pages:**

1-19 as originally filed

**Claims, No.:**

1-23 as originally filed

**Drawings, sheets:**

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	1-5, 11, 14 NO
Inventive step (IS)	Claims	1-23 NO
Industrial applicability (IA)	Claims	

**2. Citations and explanations**

see separate sheet

The negative statements with regard to novelty and inventive step made in this communication rely on the following prior art documents, which all relate to the field of sheet materials for sanitary purposes; attention is in particular drawn to the passages given in parentheses:

- (1) DE-A-3 245 196 (claims 6, 10 and 15; paragraph bridging pages 7 and 8)
- (2) GB-A-2 189 993 (page 1, lines 4 to 21, 41 to 54, 75 to 79 and 102 to 122)
- (3) US-A-3 881 489 (column 1, line 5 to 10; column 2, line 63 to column 3, line 2; column 3, lines 28 to 68; column 4, lines 14 to 20)
- (4) GB-A-2 186 233 (page 1, lines 5 to 8 and 61 to 64; page 2, lines 58 to 62; page 3, lines 21 to 31)

Document (1) discloses sheet materials which are covered by claims 1 to 3 and 5 of the international application.

Document (2) discloses sheet materials which are covered by claims 1 to 3, 5, 11 and 14 of the international application.

Document (3) discloses sheet materials which are covered by claims 1 to 5 of the international application.

The inventions defined by claims 1 to 5, 11 and 14 are thus considered to lack novelty over the state of the art.

The inventions defined by claims 6 to 10, 12, 13 and 15 to 23 are considered not to involve an inventive step because they appear to merely concretise or supplement the teaching expressed in the preceding claims by

- (i) adding technical information forming part of the common general knowledge in the relevant technical field or even present in document (1), (2), (3) or (4), or
- (ii) introducing restrictions arbitrary in the sense that they do not contribute to the solution of a meaningful technical problem derivable from the application as filed.

Concerning claim 6, it is in particular to be noted that document (4) teaches the use of

**WRITTEN OPINION  
SEPARATE SHEET**

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International application No. PCT/GB99/01756

perforated polyurethane layers as skin-contact layers in sheet materials for sanitary purposes.

09/701948

PATENT COOPERATION TREATY

PCT

REC'D 01 FEB 2001

WIPO

PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>PEND/P20878PC</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/GB99/01756</b>	International filing date (day/month/year) <b>04/06/1999</b>	Priority date (day/month/year) <b>05/06/1998</b>
International Patent Classification (IPC) or national classification and IPC <b>B32B27/12</b>		
Applicant <b>COURTAULDS TEXTILES (HOLDINGS) LIMITED et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand <b>05/01/2000</b>	Date of completion of this report <b>30.01.01</b>
Name and mailing address of the international preliminary examining authority:  <b>European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465</b>	Authorized officer <b>Schambeck, W</b> Telephone No. +49 89 2399 2135 



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01756

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

**Description, pages:**

1-19 as originally filed

**Claims, No.:**

1-20 as received on 18/07/2000 with letter of 14/07/2000

**Drawings, sheets:**

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/01756

☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

**see separate sheet**

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims 1-20
	No: Claims
Inventive step (IS)	Yes: Claims 1-20
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-20
	No: Claims

2. Citations and explanations  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/GB99/01756

**concerning Section I, item 5**

The report has been established as if the clause reading "to enable a desired flow through the first layer for discharge through said selected parts of the second layer" were not present in claim 1 since the incorporation of that clause is considered to represent an amendment going beyond the disclosure as filed.

**concerning Section V**

No disclosure can be found in the documents cited in the search report of a laminated sheet material as defined in independent claim 1 or a method for making a laminated sheet material as defined in independent claim 14, let alone technical information which might have made it foreseeable that the objects presented in the description of the application, page 2, lines 11 to 20 can be achieved by following the teachings defined in the independent claims.

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>PEND/P20878PC</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 99/ 01756</b>	International filing date (day/month/year) <b>04/06/1999</b>	(Earliest) Priority Date (day/month/year) <b>05/06/1998</b>
Applicant <b>COURTAULDS TEXTILES(HOLDINGS)LIMITED.et.al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 03 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

01



as suggested by the applicant.



None of the figures.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01756

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B32B27/12 A47C21/06 A47G9/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B32B A47C A61G A47G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 781 962 A (TOMAS JUNA D M ET AL) 1 November 1988 (1988-11-01) column 1, line 5 - line 20 column 3, line 25 - column 4, line 8 column 5, line 52 - line 56 ----	1,5
X	US 3 881 489 A (HARTWELL EDWARD WALLACE) 6 May 1975 (1975-05-06)	1-5
A	column 3, line 28 - column 4, line 34 ----	15
X	DE 32 45 196 A (LINNICH PAPIER & KUNSTSTOFF) 7 June 1984 (1984-06-07) claims 1,4,7,10,14-16; figure 2 page 4, paragraph 5 - page 5, paragraph 3 page 7, paragraph 4 - page 8, paragraph 3 ----- -/--	1-5



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

25 August 1999

Date of mailing of the international search report

06/09/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

De Jonge, S

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01756

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 189 993 A (DILLOWAY ARTHUR ALFRED) 11 November 1987 (1987-11-11) page 1, line 102 - line 122; figures 1-3 ----	1-5
X	GB 2 012 159 A (COURTAULDS LTD) 25 July 1979 (1979-07-25)	1,2,5,6
A	page 1, line 18 - line 27 page 1, line 63 - line 105 ----	3,4,7-23
X	DE 93 13 654 U (NOREGA ANSTALT SCHAAN) 23 December 1993 (1993-12-23) claims; figures 1,2 ----	1-5
X	GB 2 186 233 A (JOHNSON & JOHNSON PROD INC) 12 August 1987 (1987-08-12) claims 1,5 ----	1,5
X	EP 0 045 592 A (SMITH & NEPHEW ASS) 10 February 1982 (1982-02-10) claims 1-3,8 ----	1-6
X	EP 0 403 187 A (AOE PLASTIC GMBH) 19 December 1990 (1990-12-19) examples -----	1-5

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/01756

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4781962	A	01-11-1988	BE 1002418 A	05-02-1991
US 3881489	A	06-05-1975	AT 350015 B	10-05-1979
			AT 673774 A	15-10-1978
			AU 7234674 A	19-02-1976
			BE 819013 A	20-02-1975
			CA 1008655 A	19-04-1977
			CH 577280 A	15-07-1976
			DE 2439367 A	27-02-1975
			DK 443874 A,B,	14-04-1975
			FR 2241265 A	21-03-1975
			GB 1471721 A	27-04-1977
			IE 40440 B	06-06-1979
			IT 1020028 B	20-12-1977
			JP 50049041 A	01-05-1975
			LU 70770 A	11-06-1975
			NL 7411075 A,C	24-02-1975
			SE 388342 B	04-10-1976
			SE 7410532 A	21-02-1975
DE 3245196	A	07-06-1984	NONE	
GB 2189993	A	11-11-1987	NONE	
GB 2012159	A	25-07-1979	NONE	
DE 9313654	U	23-12-1993	NONE	
GB 2186233	A	12-08-1987	NONE	
EP 0045592	A	10-02-1982	AT 11216 T	15-02-1985
			AU 544583 B	06-06-1985
			AU 7358081 A	04-02-1982
			CA 1174548 A	18-09-1984
			DK 335881 A	31-01-1982
			GB 2081177 A,B	17-02-1982
			IE 51970 B	13-05-1987
			JP 57066752 A	23-04-1982
			US 4414970 A	15-11-1983
			ZA 8105051 A	29-09-1982
EP 0403187	A	19-12-1990	DE 3919166 A	13-12-1990
			AT 134172 T	15-02-1996
			DE 69025355 D	28-03-1996
			DE 69025355 T	18-07-1996

The demand must be filed directly with the competent International Preliminary Examining Authority if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/

## PCT

## CHAPTER II

## DEMAND

under Article 31 of the Patent Cooperation Treaty:  
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
<b>Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION</b> Applicant's or agent's file reference <b>PEND/P20878PC</b>	
International application No. <b>GB99/01756</b>	International filing date (day/month/year) <b>4 June 1999</b> (Earliest) Priority date (day/month/year) <b>5 June 1998</b>
Title of invention <b>FLEXIBLE SHEET MATERIAL AND METHOD OF MAKING SAME</b>	
<b>Box No. II APPLICANT(S)</b> Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) <b>Courtaulds Textiles (Holdings) Limited</b> <b>13/14 Margaret Street</b> <b>London</b> <b>W1A 3DA</b> <b>United Kingdom</b> Telephone No.: Facsimile No.: Teleprinter No.:	
State (that is, country) of nationality: <b>GB</b>	State (that is, country) of residence: <b>GB</b>
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) <b>McKNIGHT, Jo</b> <b>c/o Penn Nyla</b> <b>Acton Road, Long Eaton</b> <b>Nottingham NG10 1FX</b> <b>United Kingdom</b>	
State (that is, country) of nationality: <b>GB</b>	State (that is, country) of residence: <b>GB</b>
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) <b>AMBROSE-JONES, Shaun</b> <b>c/o Penn-Nyla</b> <b>Acton Road, Long Eaton</b> <b>Nottingham NG10 1FX</b> <b>United Kingdom</b>	
State (that is, country) of nationality: <b>GB</b>	State (that is, country) of residence: <b>GB</b>
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.	



Sheet No. 2.

International application No.  
GB99/01756

## Box No. III AGENT OR COMMON REPRESENTATIVE: OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: (Family name followed by given name; for a legal entity, full official designation.  
The address must include postal code and name of country.)

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Eric Potter Clarkson  
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58 The Ropewalk  
Nottingham NG1 5DD  
United Kingdom

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Facsimile No.:

(0115) 955 2201

Teleprinter No.:

37540 Potter G

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

## Statement concerning amendments:\*

1 The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description ☐ as originally filed  
☐ as amended under Article 34

the claims ☐ as originally filed  
☐ as amended under Article 19 (together with any accompanying statement)  
☐ as amended under Article 34

the drawings ☐ as originally filed  
☐ as amended under Article 34

2. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). (This check-box may be marked only where the time limit under Article 19 has not yet expired.)

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English☒ which is the language in which the international application was filed☐ which is the language of a translation furnished for the purposes of international search☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

## Box No. V ELECTION OF STATES

The applicant hereby elects all eligible States (that is, all States which have been designated and which are bound by Chapter II of the PCT)

excluding the following States which the applicant wishes not to elect:

Sheet No. 3

International application No.  
GB99/01756

## Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- |  |   |        |
|--|---|--------|
| 1. translation of international application                              | : | sheets |
| 2. amendments under Article 34   | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19  | : | sheets |
| 5. letter  | : | sheets |
| 6. other (specify)   | : | sheets |

For International Preliminary  
Examining Authority use only

received not received

<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- |   |   |
|---|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet  | 4. <input type="checkbox"/> statement explaining lack of signature                                  |
| 2. <input type="checkbox"/> separate signed power of attorney                                       | 5. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form |
| 3. <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input type="checkbox"/> other (specify):  |

## Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



Brian Dealtry

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 3, below, does not apply. ☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.3.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSSED pursuant to Rule 82.

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Demand received from IPEA on:

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

Receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum)

PEND/P20878PC

Box No. I TITLE OF INVENTION

FLEXIBLE SHEET MATERIAL AND METHOD OF MAKING SAME

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

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London  
W1A 3DA  
United Kingdom

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant  
for the purposes of:

☐ all designated  
States

☒ all designated States except  
the United States of America

☐ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

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c/o Penn-Nyla  
Acton Road, Long Eaton  
Nottingham NG10 1FX  
United Kingdom

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box  
is marked, do not fill in below.)

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant  
for the purposes of:

☐ all designated  
States

☐ all designated States except  
the United States of America

☒ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf  
of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

DEALTRY, Brian  
Eric Potter Clarkson  
Park View House  
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Telephone No.

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Facsimile No.

(0115) 955 2201

Teleprinter No.

37540 Potter G

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
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## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AL Albania .....                               | <input checked="" type="checkbox"/> LS Lesotho .....                                   |
| <input checked="" type="checkbox"/> AM Armenia .....                               | <input checked="" type="checkbox"/> LT Lithuania .....                                 |
| <input checked="" type="checkbox"/> AT Austria .....                               | <input checked="" type="checkbox"/> LU Luxembourg .....                                |
| <input checked="" type="checkbox"/> AU Australia .....                             | <input checked="" type="checkbox"/> LV Latvia .....                                    |
| <input checked="" type="checkbox"/> AZ Azerbaijan .....                            | <input checked="" type="checkbox"/> MD Republic of Moldova .....                       |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina .....                | <input checked="" type="checkbox"/> MG Madagascar .....                                |
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| <input checked="" type="checkbox"/> BR Brazil .....                                | <input checked="" type="checkbox"/> MW Malawi .....                                    |
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| <input checked="" type="checkbox"/> GD Grenada .....                               | <input checked="" type="checkbox"/> SL Sierra Leone .....                              |
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| <input checked="" type="checkbox"/> KE Kenya .....                                 | <input checked="" type="checkbox"/> ZW Zimbabwe .....                                  |
| <input checked="" type="checkbox"/> KG Kyrgyzstan .....                            |  |
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| <input checked="" type="checkbox"/> KR Republic of Korea .....                     |  |
| <input checked="" type="checkbox"/> KZ Kazakhstan .....                            |  |
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| <input checked="" type="checkbox"/> LK Sri Lanka .....                             | <input type="checkbox"/> .....   |
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<b>Box No. VI PRIORITY CLAIM</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: * regional Office	international application: receiving Office
item (1)				
05 June 1998 (05.06.98)	9812026.4	GB		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): 1

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

**Choice of International Searching Authority (ISA)**  
(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA /

**Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):**

Date (day/month/year)

Number

Country (or regional Office)

**Box No. VIII CHECK LIST; LANGUAGE OF FILING**

This international application contains the following number of sheets:

request : 3

description (excluding sequence listing part) : 19

claims : 4

abstract : 1

drawings : 3

sequence listing part of description : 0

Total number of sheets : 30

This international application is accompanied by the item(s) marked below:

1. ☒ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☒ copy of general power of attorney; reference number, if any:
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5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other (specify): **Form 23/77**

Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application:

English

**Box No. IX SIGNATURE OF APPLICANT OR AGENT**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



DEALTRY, Brian

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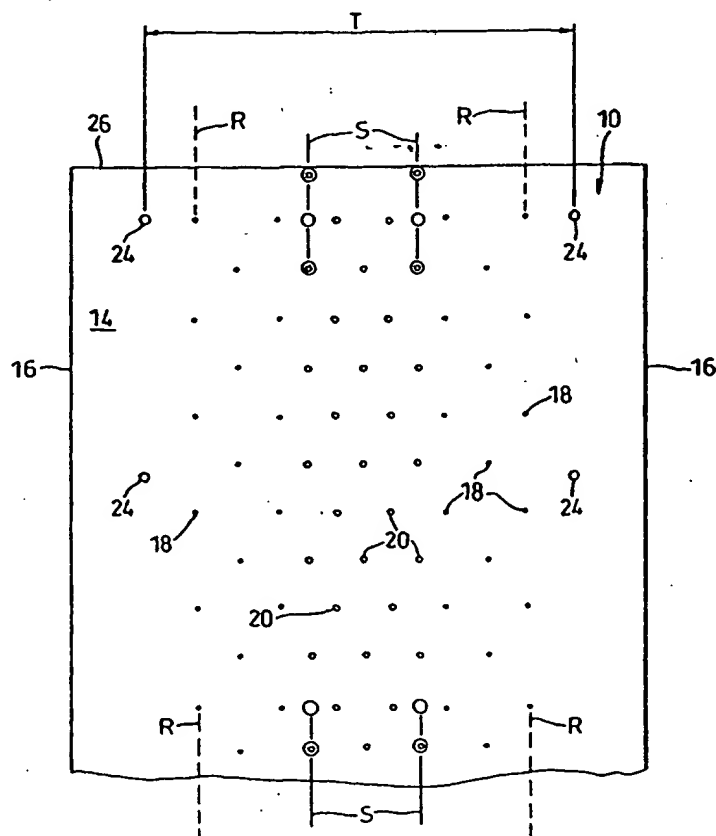
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : B32B 27/12, A47C 21/06, A47G 9/02</p>	<p>A1</p>	<p>(11) International Publication Number: WO 99/64238 (43) International Publication Date: 16 December 1999 (16.12.99)</p>
<p>(21) International Application Number: PCT/GB99/01756 (22) International Filing Date: 4 June 1999 (04.06.99) (30) Priority Data: 9812026.4 5 June 1998 (05.06.98) GB (71) Applicant (for all designated States except US): COUR- TAULDS TEXTILES (HOLDINGS) LIMITED [GB/GB]; 13/14 Margaret Street, London W1A 3DA (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): MCKNIGHT, Jo [GB/GB]; Penn-Nyla, Acton Road, Long Eaton, Not- tingham NG10 1FX (GB). AMBROSE-JONES, Shaun [GB/GB]; Penn-Nyla, Acton Road, Long Eaton, Notting- ham NG10 1FX (GB). (74) Agent: DEALTRY, Brian; Eric Potter Clarkson, Park View House, 58 The Ropewalk, Nottingham NG1 5DD (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: FLEXIBLE SHEET MATERIAL AND METHOD OF MAKING SAME

## (57) Abstract

A flexible, extensible, sheet material comprising an air-permeable first layer and a second layer, the second layer comprising an air-impermeable material of uniform thickness having a set of perforations therethrough at a selected part of the second layer. Conveniently, the material is made by a method of making a laminated sheet material comprising: (a) procuring an air permeable first layer; (b) procuring an air-impermeable second layer comprising a material of uniform thickness; (c) laminating the first and second layers to one another to provide said laminated sheet material; and (d) forming a set of perforations therethrough at a selected part of the second layer. The material may be used in protective covers for mattresses to provide ventilation of bodies of patients lying on the covers.



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## **FLEXIBLE SHEET MATERIAL AND METHOD OF MAKING SAME**

5        This invention is concerned with flexible sheet material and method of making same.

      In caring for patients in hospital, pressure-sores (often called bed-sores and more correctly known as decubitus) are a potential problem.  
10    Additionally patients may also be incontinent or have exuding wounds. To try to protect patients from the risk of pressure-sores and prevent fluid transfer to the underlying mattress and any resulting cross-infection, various sheets or cover sheets have been introduced. Such protective sheets are, of necessity, impermeable to fluids microbes and pathogens.  
15    Moreover, to reduce the risk of pressure-sore development, the sheet needs also a certain amount of stretch, thereby reducing interface pressures on the patient's most vulnerable areas.

      To this end, varying solutions have been proposed, including both  
20    "static" and "dynamic" systems. Whereas the static systems may operate as a sprung or foam block mattress with a cover sheet, the dynamic systems are inflatable and often consist of a series of cells, which are sequentially deflated so as to further reduce the interface pressure exerted on the various parts of the patient's body. Such mattresses have been  
25    successful in reducing the incidence of pressure sores and inhibiting their progression.

      A further complication to this issue is that, as a result of the sheet cover being impermeable, the patient's skin can be in direct contact with



fluids, which can inhibit the healing process. For wounds (including pressure sores) to heal most effectively, they need to be exposed to a reasonable amount of air, and not left in contact with moisture.

5 In order for a material to be suitable for use as a protective mattress cover, it should preferably have the following properties: impermeability to liquid, good heat transmission, flexibility, resilience, stretch and recovery. This allows such materials to readily respond to the contours of the patient's body.

10

One of the various objects of the present invention is to provide a flexible sheet material through which air can be delivered.

Another of the various objects of the present invention is to provide  
15 an improved flexible sheet material suitable for use as a mattress cover.

Another object of the present invention is to provide a flexible sheet material suitable for use as a patient-contacting sheet material to enable control of air transfer to regions of the sheet material which might come  
20 into contact with a patient's body.

In one aspect the invention may be considered to provide a flexible sheet material comprising an air-permeable first layer and a second layer, the second layer being substantially air-impermeable but having a  
25 controlled air permeability at a selected part of the second layer.

Preferably, the first and second layers are produced separately and the second layer (which is preferably of uniform thickness) is then laminated to the first layer. In a preferred sheet material in accordance

with the invention the second layer comprises an air-impermeable material having a set of perforations therethrough at the selected part.

Preferably, the first layer is a textile material, conveniently a relatively  
5 extensible, flexible and resilient textile material; suitably the textile material is preferably knitted (but may be woven or a 'non-woven' provided that they have the necessary characteristics - stretch is specially important) and is a relatively open textile material with high loft to provide the desired air permeability characteristics.

10

Preferably, the second layer is a relatively extensible, flexible and resilient impermeable plastics material, suitably a polyurethane composition. Such compositions are typically polyester or polyether prepolymers extended by means of aliphatic or aromatic polyisocyanates  
15 in combination with polyhydroxyl or polyamino compounds. The resulting elastomers may be applied as solutions, emulsions, in molten or prepolymerised forms. The second layer is preferably of uniform thickness, to minimise the risk of any thin regions being present in the second layer which may lead to unwanted leakage through the second  
20 layer.

In a first sheet material in accordance with the invention the perforations may be of different dimensions in a first region of the selected part from those in a second region, the perforations in the first  
25 region suitably being larger than those in the second region. Conveniently, the perforations in the first region each have a diameter between 0.2 mm and 1 mm and the perforations in the second region have a diameter between 0.1 mm and 6 mm.

The airflow through the perforated regions of the sheet material in accordance with the invention is preferably sufficient to give satisfactory ventilation.

5 In the first sheet material in accordance with the invention the first region of perforations extends lengthwise along a central part of the sheet material and the second region extends lengthwise at either side of the central part. Conveniently, the central part is between 25 cm and 35 cm in width preferably about 30 cm. Conveniently each part of the second  
10 region at either side of the first region is between 7.5 cm and 15 cm wide, preferably about 10 cm. The combined width of the first and second regions is preferably between 40 cm and 65 cm, more preferably between 50 cm and 60 cm. In the first region the perforations are preferably between 0.1 and 1.6 mm in diameter, more preferably between 0.2 mm  
15 and 1 mm. The perforations in the second region are preferably between 0.1 mm and 1.6 mm in diameter, more preferably between 0.1 and 0.6 mm.

Alternatively the perforations may all be of the same size, in which  
20 case the perforations are preferably between 0.1 mm to 1.6 mm in diameter, more preferably between 0.6 to 1.2 mm.

The first sheet material in accordance with the invention comprises a third layer on a face of the first layer opposite that carrying the second  
25 layer, the third layer conveniently being formed separately from the first and second layers and laminated thereto. The third layer is air-impermeable and preferably of uniform thickness and in this first sheet material the first layer is permeable to air in a direction parallel to the surface of the sheet material as well as in a direction extending

transversely to the surface of the sheet material. Conveniently, the third layer is a polyurethane composition. Although polyurethane compositions are preferred for use as the second or third layers, other materials, for example PVC, synthetic rubber or acrylics, may prove suitable for use in materials in accordance with the inventions provided that they have the necessary characteristics.

A second sheet material in accordance with the invention merely comprises the first and second layers, no third layer being included. The perforations in the second layer range between 0.1 and 1.6 mm in diameter, more preferably between 0.1 and 1 mm in diameter.

Although the perforations described herein are generally circular, other shapes might be used provided that their areas are appropriate. Thus, if other shapes are used in materials otherwise similar to the first or second materials, their areas may correspond with the areas of the preferred circular perforations.

In another aspect the invention may be considered to provide a method of making a laminated sheet material comprising:-

- (a) procuring an air permeable first layer;
- (b) procuring an air-impermeable second layer comprising a material of uniform thickness;
- (c) laminating the first and second layers to one another to provide said laminated sheet material; and
- (d) forming a set of perforations through the second layer at a selected part thereof.

Preferably, in carrying out a method in accordance with the invention the first layer is a textile material, preferably a knitted textile fabric which is of open construction and high loft and is flexible, resilient and extensible. Preferably, the second layer is an impermeable plastics sheet material, suitably a polyurethane composition and is preferably flexible, extensible and resilient.

Preferably, the second layer is laminated with the first layer, more preferably by transfer coating but other laminating techniques may be used, eg. hot melt, adhesive spot techniques or pressure sensitive adhesive films. In transfer coating the second layer is formed by coating a support substrate, conveniently a release paper, with a layer of coating material of uniform thickness by any well known coating technique, the coating material conveniently being a polyurethane composition. The coating material is then cured or allowed to cure to form a flexible sheet of uniform thickness; more than one layer of coating material may be applied if desired. A thin adhesive (or tie) coat is then applied to the surface opposite the substrate and the first layer is brought into contact with the tie coat and pressed gently against it, thereafter being cured or allowed to cure to securely laminate the first layer and second layer to one another. Laminating by transfer coating avoids undue penetration of the first layer thus militating against undesirable reduction in flexibility or, extensibility resilience of the finished sheet material.

The perforations may be made by any suitable technique but are preferably made using a laser system after the first and second layers have been laminated to one another, the laser being chosen to perforate the second layer at selected positions but to not perforate or significantly affect the first layer. Although the perforations could be made whilst the

second layer is still supported by the substrate prior to being laminated with the first layer, that is not preferred.

In perforating the second layer, the perforations are chosen to be  
5 such that the ratio of area of the perforations in the selected perforated part to the area of solid material in the selected part ranges between 1:5 cm<sup>2</sup> and 1:50 cm<sup>2</sup>. However, the ratio of the area of the perforations to the area of the solid material of the selected part of the second layer may be varied according to the airflow which is desired through the  
10 perforations.

In a method in accordance with the invention of making the first sheet material in accordance with the invention, a third layer is laminated to a face of the first layer opposite that to which the second layer is  
15 laminated, preferably by transfer coating. The third layer is air-impermeable and of uniform thickness, to minimise the risk that unwanted leakage of air through the third layer may arise.

20 The second sheet material in accordance with the invention is produced by terminating the method after laminating the first and second layer and perforating the second layer.

Material in accordance with the invention may be used in the  
25 manufacture of cover sheets for mattresses and for other purposes where it is desirable to supply a controlled flow of air to preselected locations. For example, material in accordance with the invention comprising three layers may be utilised in the manufacture of a body suit with the second layer on the inside, for treatment of patients suffering from hypothermia

where warm air may be supplied through the perforations to the interior of the suit.

There now follows a detailed description to be read with reference  
5 to the accompanying drawings of a flexible sheet material embodying the invention, and a method of making the sheet material likewise embodying the invention. It will be realised that the sheet material and methods have been selected for description to illustrate the invention by way of example. Although the second and third layers of a preferred sheet material in  
10 accordance with the invention are of uniform thickness with a set of perforations through the second layer at a selected part, other materials having controlled air permeability may be used. For example such materials (conveniently polyurethane compositions) may be made by coagulation techniques to form a microporous second layer, or other  
15 techniques for forming microporous sheet materials; such materials where construction permits, have characteristics similar to those referred to herein in respect of sheet material in accordance with the invention set out in Claim 1.

20 Irrespective of the manner in which the sheet material is rendered air permeable, to deliver a controlled air flow it is important to select suitable air transmission characteristics at the selected part of the material. Thus, for example, the air permeability should be sufficient to deliver a desired air flow rate eg. where the material is to be used to ventilate a patient.

25

Furthermore, where the material is to be used as a mattress cover the sheet material may be adapted to provide at least two lengthwise extending air permeable regions, a first region extending along a central part of the sheet material and a second (or further) regions at either side of the central

region; the central region conveniently has a greater air flow capacity than the second (or other) regions whereby to facilitate the ventilation of desired parts of the body of a patient supported on the sheet material.

5           Alternatively, when used as a mattress cover, the perforations may be arranged in an array centrally located relating to the mattress so as to correspond to that area which supports the torso region of a person lying on the mattress.

10           In the accompanying drawings:-

Figure 1 is a diagrammatic plan view showing a first sheet material embodying the invention; and

Figure 2 is a view of the first sheet material embodying the invention showing a perforated part of the material on a larger scale.

15           Figure 3 is a diagrammatic plan view of a further sheet material embodying the invention;

Figure 4 is a part sectional view taken along line IV-IV in Figure 3;

Figure 5 is a diagrammatic plan view of a strip of the sheet material shown in figure 3.

20           The first illustrative sheet material 10 is a flexible, resilient material and comprises an air permeable first layer 12 (see Figure 2). The first layer 12 is a loosely knitted high loft textile fabric which is relatively open in structure and is between 200 and 1000 micrometers in uncompressed thickness, more preferably between 200 and 600 micrometers and  
25           conveniently about 400 micrometers; the thickness depends on the end use to which it is intended to put the material. The textile fabric which provides the first layer 12 is readily permeable to air considered in a direction parallel to the surface of the sheet material 10, as well as in a direction transverse to the sheet material 10.



The first layer 12 is laminated to a second layer 14 which is of uniform thickness but has a set of perforations 18, 20 extending through a selected part of the second layer 14. The selected part of the first sheet material 10 is indicated by dashed lines R which are parallel with opposite parallel edges 16 of the sheet material. The perforations 18, 20 are of different dimensions and are grouped in two regions. A first, central region lies between lines S parallel with the lines R and extends lengthwise along a central part of the sheet material 10; the perforation 20 are disposed in the first region. The perforations 18 are disposed in a second region which extends at either side of the first region lengthwise of the sheet material, the second region being disposed between one of the lines R and the adjacent line S. The perforations 20 in the first region are larger than those 18 in the second region and both sets of perforations are generally circular; however, the perforations may all have the same diameter or be of greater diameters according to the use to which the sheet material is to be put.

In the first illustrative sheet material the perforations 20 are preferably between 0.1 and 1.6 mm in diameter, more preferably between 0.2 and 1 mm in diameter. The perforations 18 are preferably also between 0.1 and 1.6 mm in diameter and more preferably between 0.1 and 0.6 mm in diameter.

The first illustrative sheet material further comprises a third layer 22 on the face of the layer 12 opposite the face carrying the second layer 14. The third layer is air-impermeable and provided by a polyurethane film of uniform thickness.

The second and third layers 14, 22 are conveniently of the same thickness (but may be of different thicknesses) preferably between 20 and 100 micrometers thick and more preferably between 20 and 60 micrometers thick, suitably about 40 micrometers.

5

In order to enable air to be introduced between layers 14, 22, the first illustrative sheet material further comprises larger openings 24 in marginal regions of the sheet material 10 adjacent the edges 16. The openings 24 conveniently are of about 30 mm diameter and the openings 10 24 in the second layer 14 may be provided by complete removal of the second layer 14 for the whole of the diameter of the opening 24 or by a series of closely adjacent holes within the boundary defining the opening 24.

15 The first illustrative sheet material 16 has an air impermeable seal along the opposite edges 16.

A second sheet material embodying the invention is generally similar to the first illustrative sheet material described above except that 20 the third layer 22 is omitted as are the openings 24 in the surface 14, and as is the impermeable seal along the edges 16, 26.

The first and second illustrative sheet materials are made by carrying out a method embodying the invention. In carrying out the first 25 illustrative method a suitable air permeable textile fibre fabric is procured to provide the first layer. The textile fibre fabric is conveniently supplied in a continuous length wound on a roll from which it is withdrawn to provide the first layer.

The second layer is made by coating a substrate with a layer of suitable polyurethane coating composition to provide on the substrate a polyurethane composition coating having a uniform thickness. The substrate is suitably a paper with a release surface. The paper may  
5 conveniently be supplied from a roll and the polyurethane coating coated onto the release surface by known coating techniques. The polyurethane coating is then cured to provide on the substrate a film of polyurethane of uniform thickness to form the second layer. If desired a plurality of separate polyurethane coatings may be applied to form a multi-coat second  
10 layer. The second layer is then coated with a thin tie coat which may be a further polyurethane composition (or other suitable adhesive eg. acrylic) but of much less thickness than the film which provides the second layer. Whilst the tie coat is still in a soft and tacky condition it is brought into engagement with the first layer and gently pressed thereagainst, the tie  
15 coat then being cured to laminate the second layer 14 to the first layer. This method of applying a surface coating to a substrate is commonly referred to as transfer coating. The first and second layers may be laminated together in this way to provide a continuous laminated sheet material.

20 In making the first illustrative sheet material, in carrying out this illustrative method, a third layer 22 provided by a polyurethane composition is applied to the first layer on the opposite face from that on which the second layer 14 is applied by a transfer coating technique, similar to that of the lamination of the first and second layers; the second  
25 layer 14 will, usually, have been separated from the support substrate prior to laminating with the third layer.

The perforations 18, 20 (and where appropriate openings 24) are preferably formed in the second layer after it has been laminated to the

first layer and has been separated from the release coat carried by the substrate on which the second layer is coated, but before the third layer is laminated on the opposite face of the first layer.

5           The second layer is perforated using a laser system which is able to perforate the second layer 14 at the required locations and with perforations of the required diameter, as the sheet material comprising the first and second layers is moved through the laser system operating simultaneously in line with the coating system (although this may be a  
10       separate, remote operation, if required), in a continuous production technique (rather than a batch processing technique). A suitable laser system is available from the Spanish company MACSA under the trade name MAC2000 CO<sub>2</sub>, which includes a CO<sub>2</sub> sealed laser having a wavelength of 10.6 micrometers. The same laser system may be used to  
15       produce the openings 24 in the layer 14 where necessary .

          If the second illustrative material is to be produced, provision of the openings 24 is not necessary and it is not necessary to laminate the third layer to the first layer 12.

20           Should the illustrative method be employed to produce the first illustrative material then it will be necessary to form the openings 24 and to laminate the third layer 22 to the first layer as outlined above.

          In carrying out the illustrative method of making the first  
25       illustrative material it is necessary to form an air impermeable seal along the opposite lengthwise edges 16 of the sheet material produced and this can be done by any convenient means, for example ultrasonic welding or high frequency welding, use of an impermeable tape folded round the edge

and sealed to the second and third layers, heat sealing or any other suitable sealing system.

Where the illustrative materials are to be used to provide mattresses  
5 covers the width of the sheet material between the opposite edges 16 is conveniently between 85 and 150 cm, preferably between 85 cm and 120 cm. The region between the lines R in which the perforations are to be formed is suitably between 40 cm and 65 cm in width, preferably between 50 cm and 60 cm in width. Where openings 24 are formed in the second  
10 layer 14 they are conveniently closer to the perforated region R than the edges 16 of the fabric and the spacing between the openings is conveniently between 70 cm and 95 cm, preferably between 75 cm and 85 cm, depending on the width of the perforated region between the lines R.

15 Where one of the illustrative sheet materials is to be used as a cover for a mattress it is cut into discrete lengths, suitably between 140 cm and 360 cm in length and preferably between 210 cm and 250 cm in length.

For the first illustrative sheet material the transverse cut edges such  
20 as the edge 26 must be sealed together by any suitable means for example as used to seal the edges 16 in carrying out the illustrative method to create an airtight seal between the second and third layers. If desired the lengthwise edges 16 may also be sealed during manufacture of the cover instead of when making the first illustrative sheet material. For each such  
25 mattress cover there are conveniently five openings 24 along each side of the cover. Connecting means may be sealed to the layer 14 around the openings 24 to provide a supply of air under pressure to the openings 24.

In use of a cover comprising the first illustrative sheet material the cover is placed on a mattress with the second layer 14 uppermost and air under pressure is supplied to the openings 24. The air then permeates through the first layer between the second and third layers and the air escapes through any of the openings 18, 20 which are not completely closed by the patient's body. In mattress systems utilising pockets which are inflated sequentially, those of the perforations 18, 20 which are aligned with a deflated pocket will not be closed off by the patient's body which will be supported only by the inflated pockets and thus air can leak from the unclosed perforations 18, 20 to ventilate the exposed regions of the patient's body. When the previously deflated pockets are re-inflated the patient's body will be supported by the inflated pockets and the corresponding perforations 18, 20 will partially be closed by the patient's body but as others of the pockets deflate, those of the perforations 18, 20 corresponding with the deflated pockets will be open and ventilate the adjacent parts of a patient's body in this way. Thus, the whole of the patient's body can be ventilated in parts sequentially.

Because the air is supplied from edge regions of the covers formed from the first illustrative sheet material, there will tend to be an air pressure drop across the material from the edge regions towards the centre. The perforations 20 in the centre therefore are of larger diameter than those perforations 18 closer to the edges 16 to facilitate an even distribution of the air escaping from the perforations across the perforated region of the sheet material. If desired there can be perforations of several different diameters, the smallest diameter perforations being closest to the edges 16 and the perforations being of progressively larger diameter towards the centre of the sheet material. The sizes of the

perforations 18, 20 are chosen to provide the required air distribution in the use of the material.

The third layer of the first illustrative sheet material not only provides an air impermeable backing layer so that air introduced under pressure through the openings 24 is forced to escape through the perforations 18, 20 but also ensures that no body fluids leak through the cover sheet onto the underlying mattress, thus keeping the underlying mattress clean and sterile.

10

After use the cover sheet may be disposed of for hygiene reasons.

Although in the first illustrative sheet material, the openings 24 are provided in the second layer 14 for the introduction of air under pressure, the openings for introduction of air under pressure could if more convenient, be formed in the third layer.

The second illustrative sheet material comprising only the first and second layers may be used in forming an inflatable mattress cover by forming a cover of the second illustrative and sealing the cover sheet to an impermeable backing material around the lengthwise and transverse edges of the cover sheet to form an envelope with the second illustrative material forming one face. Air under pressure may then be introduced into the envelope formed between the cover sheet and the backing layer to inflate the envelope, the air under pressure leaking gradually from the perforations 18, 20 to ventilate the body of a patient lying on the cover.

In this case, where the second illustrative sheet material forms one side of an inflatable envelope, the perforations 18, 20 may all be of the

same diameter or may vary in a manner similar to those of the first illustrative sheet material..

5 The region of the illustrative sheet material in which the perforations are formed are chosen to be of sufficient width to provide adequate ventilation to the bodies of patients who will lie on a cover sheet formed from the material.

10 Sheet materials generally similar to the illustrative materials can be used for purposes other than mattress covers as the sheet materials have an engineered permeability, the air permeability of the materials in accordance with the invention being able to be closely controlled in accordance with the end use requirements.

15 An alternative arrangement for introducing air in between layers 14, 22 is provided in the embodiment 70 illustrated in Figures 3 to 5.

In embodiment 70, a pair of longitudinally extending ducts 71 are preferably provided.

20

Preferably each duct 71 is formed by a longitudinal edge 12a of the first layer 12 and a seal line 73 formed between layers 14, 22. Accordingly in between edge 12a and a seal line 73 layers 14, 22 form an open space therebetween and so define a duct 71.

25

Air is introduced at one or both ends of each duct 71 and permeates into the fabric layer 12 from edge 12a.



Preferably the layers 14, 22 are laminated together over the marginal region between seal line 73 and the adjacent edge 16. Preferably the marginal region has a width of about 50 mm.

- 5            Preferably the width of each duct 71 (ie the distance between edge 12a and seal line 73) is between 15 to 30 mm, more preferably between 20 to 25 mm.

10           The ducts 71 extend longitudinally of the sheet and so can conveniently be incorporated integrally with the sheet 70 during the manufacturing process as is illustrated in Figure 5 wherein a strip 76 of sheets 70 joined end to end are initially produced, the strip 76 being severed to form individual sheets 70.

- 15           In the illustrated embodiment 70, a pair of ducts 71 are provided. It will be appreciated that only one or more than two longitudinally extending ducts 71 may be provided.

20           In sheets 70, perforations 20 only are provided, preferably in an array 80 comprising columns 81 and rows 82. Preferably the array 80 covers an area centrally of the sheet 70 which corresponds to that area which will support the torso of a person lying on a mattress covered by sheet 70.

- 25           Preferably the array 80 has a length of between 900 to 1100 mm, and has a width of between 400 to 430 mm.

Preferably the array 80 comprises about nine rows 82, the spacing between adjacent rows 82 being about 120 mm.

The array 80 may comprise six columns 81, the spacing between adjacent columns 81 being about 85 mm.

- 5           Alternatively, the array 80 may comprise ten columns 81; the spacing between adjacent columns 81 being about 45 mm.

          Preferably the perforations 20 defining the array 80 are of the same size, and preferably are between 0.1 mm to 1.6 mm in diameter, more  
10           preferably between 0.6 to 1.2 mm.

          Alternatively, it is envisaged that the array 80 may extend continuously for substantially the entire length of sheet 70. Alternatively, more than one array 80 may be provided for each sheet 70, the arrays 80  
15           being spaced from one another in the longitudinal direction of the sheet 70.

CLAIMS

1. A flexible sheet material comprising an air-permeable first layer and a second layer, the second layer being substantially air-impermeable  
5 but having a controlled air permeability at a selected part of the second layer.
2. A sheet material according to Claim 1 wherein the second layer is of uniform thickness and laminated to the first layer.
- 10 3. A sheet material according to Claim 2 wherein the second layer comprises an air-impermeable material having a set of perforations therethrough at the selected part.
- 15 4. A sheet material according to claim 3 wherein all the perforations are to the range of 0.1 mm to 1.6 mm in diameter, preferably 0.6 mm to 1.2 mm.
5. A sheet material according to any of Claims 1 to 4 wherein the first  
20 layer is a textile material.
6. A sheet material according to Claims 3, 4 or 5 wherein the second layer is a polyurethane composition.
- 25 7. A sheet material according to Claim 3 wherein the selected part comprises a first region and a second region and wherein the perforations are of different dimensions in the first region from those in the second region.

8. A sheet material according to Claim 6 wherein the perforations in the first region are larger than those in the second region.
9. A sheet material according to Claim 8 wherein the perforations in the first and second region each have a diameter between 0.1 mm and 1.6 mm.
10. A sheet material according to Claim 9 wherein the first region extends lengthwise along a central part of the sheet material and the second region extends lengthwise at either side of the central part.
11. A sheet material according to any one of the preceding claims comprising a third layer on a face of the first layer opposite that carrying the second layer, the third layer being air-impermeable and the first layer being permeable to air in a direction parallel to the surface of the sheet material and in a direction extending transversely to the surface of the sheet material.
12. A sheet material according to Claim 10 wherein the third layer is a polyurethane composition.
13. A sheet material according to claim 11 or 12 wherein one or more longitudinally extending ducts are provided between the second and third layers for ducting air under pressure to the first layer.
14. A sheet material according to either one of Claims 11 and 12 comprising one or more openings in the second layer through which air under pressure can be supplied to the first layer.

15. A method of making a laminated sheet material comprising:-
- (a) procuring an air permeable first layer;
  - (b) procuring an air-impermeable second layer comprising a material of uniform thickness;
  - 5 (c) laminating the first and second layers to one another to provide said laminated sheet material; and
  - (d) forming a set of perforations through the second layer at a selected part thereof.
- 10 16. A method according to Claim 14 wherein the first layer is a textile material.
17. A method according to either one of Claims 14 and 15 wherein the second layer is a polyurethane composition.
- 15 18. A method according to any one of Claims 14 to 16 wherein the perforations are made by perforating the second layer after the first and second layers have been laminated to one another.
- 20 19. A method according to any one of Claims 14 to 17 wherein the perforations in a first region of the selected part are of different dimensions from those in a second region.
- 25 20. A method according to any one of Claims 14 to 18 comprising laminating a third layer to a face of the first layer opposite that to which the second layer is laminated, the third layer being air-impermeable and of uniform thickness.

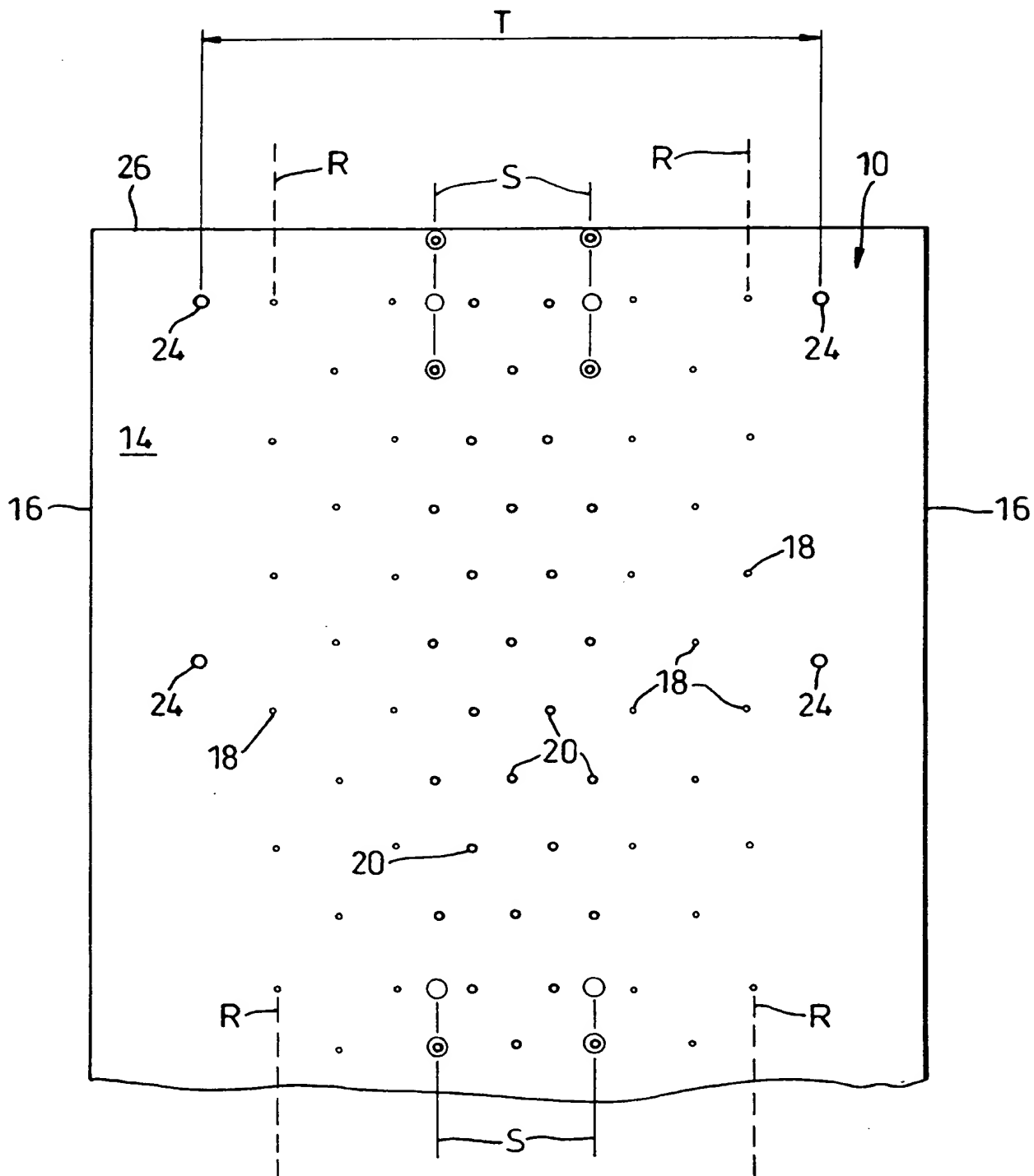
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21. A method according to any one of Claims 14 to 19 wherein the second layer is laminated with the first layer by transfer-coating.

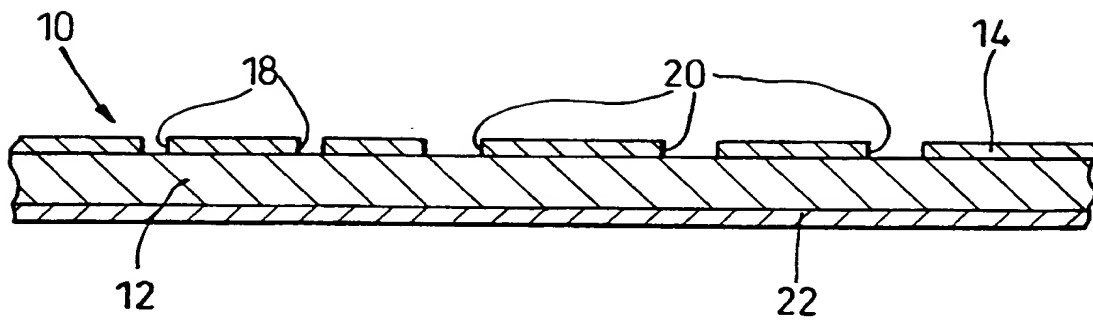
22. A method according to any one of Claims 14 to 20 wherein the  
5 third layer is laminated with the first layer by transfer-coating.

23. A method according to any one of Claims 14 to 21 of making a laminated sheet material according to any one of Claims 1 to 13.

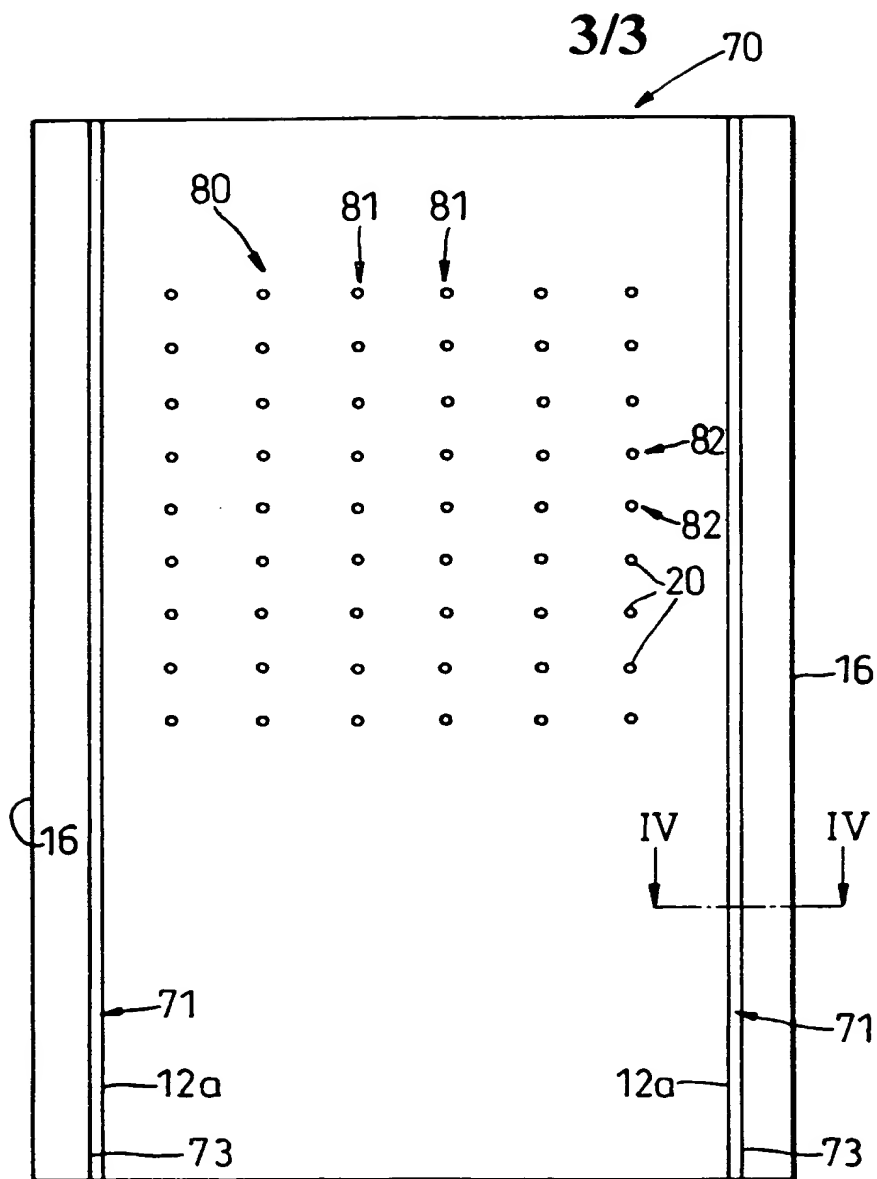
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**Fig. 1**

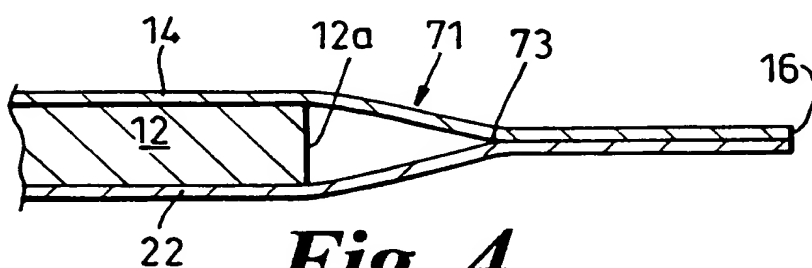
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***Fig. 2***

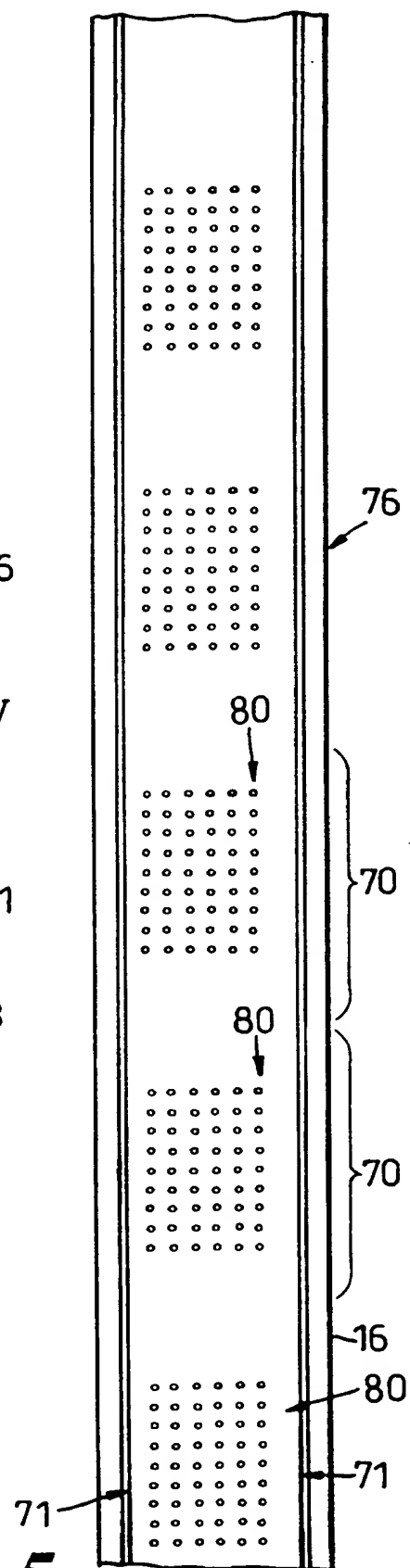




**Fig. 3**



**Fig. 4**



**Fig. 5**

# INTERNATIONAL SEARCH REPORT

In tional Application No

PCT/GB 99/01756

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B32B27/12 A47C21/06 A47G9/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B32B A47C A61G A47G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

25 August 1999

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# INTERNATIONAL SEARCH REPORT

In International Application No  
PCT/GB 99/01756

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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